The Effect of Sectoral Employment Composition on Tax Revenue in Tanzania.

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Abstract: *This study examined the effect of sectoral employment composition on tax revenue in Tanzania. This study is motivated by structural transformation, which has altered the employment composition across the main sectors of the economy. Time series data were used from a period of 1970 to 2018. Estimation was performed using the Autoregressive Distributed Lag (ARDL) technique. The results revealed that, in the long run, only a share of employment in the industry sector has a positive effect on tax revenue in Tanzania. In the short run, employment in the industry sector has a negative effect, whereas employment in the service sector and trade openness have a positive effect. Conversely, the employment share in the agriculture sector and GDP per capita exhibit negligible effects. The study adds to the present literature by examining both short-term and long-term impacts, using employment composition in each main economic sector as an independent variable instead of relying solely on aggregate employment. Furthermore, theoretically, a study contributes by explaining how the transformation of sectoral employment composition affects tax revenue. Therefore, policymakers and the Tax Revenue Authority are advised to encourage the transformation of sectoral employment composition to enhance tax revenue collection.*

Keywords: Tax Revenue, Sectoral Employment Composition, ARDL.

JEL classification: H20, J21, O55, L16

1.0 Introduction

Tax revenue is important for both developed and developing countries in order to finance public services (Jemiluyi & Jeke, 2023; Nguyen et al., 2022). As such, scholars and institutions agreed that developing countries should prioritise domestic revenue in order to finance their public services (Wandaogo et al., 2022; World Bank, 2024). Taxation is the most cost-effective and significant domestic revenue stream for governments on a worldwide scale (Alabede, 2018; Bolívar et al., 2016; Jemiluyi & Jeke, 2023; Moore & Prichard, 2020). Nevertheless, a significant proportion of developing countries have the challenge of generating inadequate tax revenue to sufficiently finance essential public services (Alabede, 2018; Hammond et al., 2023; World Bank, 2024). In developing countries, low tax revenue is a significant contributing factor to limited progress.

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According to statistical data, advanced nations have an average tax revenue to Gross Domestic Product (GDP) ratio of 40%, but low-income countries and lower-middle countries have an average ratio of 15% (World Bank, 2020; World Bank, 2021). The United Nations recommends that developing countries earn around 20% of their tax revenue from their GDP in order to fund public expenditures (World Bank, 2020). Regrettably, a significant proportion of low-income countries (86%) and lower-middle countries (43%) fail to meet the United Nations criterion for collection, as reported by the World Bank in 2024.

Statistical data indicate that countries with lower and middle incomes are incapable of generating adequate tax revenue. Over the previous decade, Sub-Saharan African (SSA) countries have had a tax-to-GDP ratio of 16.5%, which is not adequate for funding public services (World Bank, 2020). In addition, Tanzania's tax revenue as a percentage of its GDP has been relatively low over the past decade, totalling 11.46% (Bank of Tanzania, 2019; World Bank, 2020). The average is lower than the defined standards set by the United Nations. Developing countries have undertaken various strategies, including structural transformation, in response to low tax revenue. These strategies have been in place since the 1930s, as discussed by Fisher (1939), Kuznets (1973) and Lewis (1954). In addition, the significance of structural transformation in Africa has been recognised since the 1970s (African Development, 2016; Cevik et al., 2019; McMillan et al., 2014; UN-Habitat, 2016). Structural transformation refers to economic policies that seek to reallocate workers from the agriculture sector to the industry and service sectors to enhance productivity and raise tax revenue (Cevik et al., 2019). Consequently, this action is thought to lead to a steady decline in the employment of the agriculture sector and a rise in the industry and services sectors (Agbenyo, 2020; Amadou & Aronda, 2020; Cevik et al., 2019; Herrendorf & Rogerson, 2013).

Statistical data from Tanzania reveals a significant decrease in employment in agriculture sector throughout the years. Specifically, the percentage of people employed in agriculture dropped from 91.36% in 1970 to 69.69% in 2018. In contrast, there was a parallel rise in employment rates in the service and industry sectors during the same time frame (Bank of Tanzania, 2019; World Bank, 2020). In a country with a large number of jobs in the formal sector, there is a possibility for rapid economic growth, which would have a positive effect on tax revenue. Taxation applies to formal workers who are employed in formal employment. On the other hand, those engaged in informal employment, known as informal labourers, deliberately avoid paying taxes, thus evading their financial responsibility (Shawn et al., 2012; Skott, 2021). Nevertheless, the effect of sectoral employment composition due to structural transformation in the main economic sectors on tax revenue in developing countries remains uncertain. The government's tax collection is greatly influenced by employment in a particular sector, as individuals are obligated to pay taxes according to their income earned from employment. The difficulty lies in the varying levels of simplicity with which different sectors might be subject to taxation. Developing a more accurate understanding of the

 https://doi.org/10.58548/2025jaep31.0122

sectors that have a substantial impact on tax revenue through employment can provide more efficient policy suggestions for increasing tax revenue. This is because certain sectors of the economy are more receptive to taxes than others (Rahim & Asma, 2019).
Regrettably, although there have been numerous comprehensive studies on the relationship between sectoral composition and tax revenue, the majority of these studies have focused solely on the influence of value-added composition on tax revenue. Consequently, they have neglected to consider the effect of sectoral employment composition on tax revenue (Arodoye & Izevbigie, 2019; Epaphra & Kaaya, 2020; Karagöz, 2013; Mawejje & Munyambonera, 2016). The individuals who attempted to establish a connection between employment and tax revenue disregarded employment in specific sectors (Andrejovská & Puliková, 2018; Caro & Sacchi, 2020; Hamdan & Rana, 2021; Khujamkulov, 2016; Mazhar & Méon, 2017; Siami-namini et al., 2018; Vlachaki, 2015). From this perspective, it is challenging to visually understand how the employment composition in each major sector of the economy affects tax revenue. This study emphasises the importance of examining employment composition as a result of structural transformations in each sector. Analysing individual sectors allows for a better understanding of the impact of employment sub-sectors on tax revenue. Hence, the primary objective of this study was to fill the gap in existing research by investigating the effect of employment in specific sectors of the economy on the tax revenue.
Furthermore, prior research focused on establishing the relationship between overall employment and tax revenue using panel data to obtain conclusive results. When using panel data analysis, it cannot be easy to differentiate the behaviour of explanatory variables in a certain nation because there may be unique traits that differ among a group of countries (Karagöz, 2013). Every country exhibits distinct characteristics in terms of economic, trade system, political and protective policies (Ndoye, 2014; Neog & Gaur, 2020; Regassa, 2017). This study used time series data to fill the current knowledge gap and differentiate a certain phenomenon's behaviour.
The findings presented in this study add significant value to the current knowledge by examining how employment composition in different sectors affects tax revenue. The current body of literature focuses primarily on sectoral employment and economic growth, overlooking the analysis of sectoral employment composition and tax revenue. Moreover, this study provides a significant addition to the ongoing efforts of the Tanzanian government, policymakers, and tax administrators to improve their understanding of employment composition patterns in the main economic sectors. The goal is to provide direction for national policy development. Furthermore, this study provides a significant theoretical contribution by explaining how the transformation of sectoral employment composition in the main sectors of the economy affects tax revenue. Structural transformation theory and tax level determinant theory did not show this effect. This forms the theoretical foundation and contributes to the study.

The current study is organised in the following manner: Section 2 explores the literature review and development of research hypotheses. Furthermore, Section 3 dealt with research methodology. Findings and discussion are reported in Section 4. Section 5 provides conclusions of the study.

2.0 Literature Review and Hypotheses

2.1 Structural Transformation Theory

The structural transformation theory is a development theory that emerged after World War II (Agbenyo, 2020). William H. Sewell was one of the individuals who expressed an interest in the advancement of this theory (Sewell, 1992). Nevertheless, William Arthur Lewis later introduced the idea in the 1970s, a period when it gained important implications due to noticeable shifts in the global political landscape (Agbenyo, 2020). To clarify, the theory emphasises the process by which developing nations shift their economic structure from a heavy reliance on agriculture to industry and service sectors. According to Lewis, structural transformation is the process by which an underdeveloped country experiences growth through the shifting of labour from one sector to another. Therefore, experts predict that the shift from agriculture to modern sectors will result in an increase in job creation, tax base, and revenue (Agbenyo, 2020).

Many scholars have engaged in extensive debates over the theory in a similar context. According to Lewis and Kuznet, structural transformation refers to the process of shifting a country's economic structure from agriculture to industry, and subsequently from industry to service (Herrendorf & Rogerson, 2013). According to UN-Habitat (2016), structural transformation is the process of replacing traditional activities with new or more productive activities and resources. Essentially, this phenomenon is characterised by the shift of workers from the agricultural sector to the industrial and service sectors, resulting in increased productivity and wages. The idea aims to introduce sectoral transformation as a crucial factor in improving economic growth and expanding the tax base for revenue mobilisation in developing nations (Agbenyo, 2020). Many earlier studies have applied this approach by connecting structural transformation to economic growth while disregarding revenue growth. Therefore, this study adopts the theory of tax level determinants to examine the relationship between the tax base resulting from structural transformation and tax revenue. Using the structural transformation theory in this study is similar to what other researchers have found. For example, Agbenyo (2020), Cevik et al. (2019), Kibret and Mamuye (2016) and McNabb (2018) all found that sectoral structural transformation has a greater effect on how much tax revenue a region or country makes by expanding the tax base.

 https://doi.org/10.58548/2025jaep31.0122

2.2 Tax Level Determinant Theory

Lotz and Morrs formulated the tax-level determinant theory in 1967 (Lotz & Morrs, 1967). It has been more significant, especially in developing countries. The theory highlights that the availability of tax bases is the determining factor for tax revenue. From the theoretical point of view, it becomes evident that increasing the tax base in key areas of the economy leads to more effective revenue growth. Furthermore, the theory states that GDP per capita and trade openness are the primary determinants of tax revenue in developing countries. The theory takes into account the tax base in the key sectors of the economy when deciding on tax revenue collection. This theory provides a suitable justification for the study because it emphasises the importance of tax bases for the main sectors of the economy. Nevertheless, it is crucial to acknowledge that the tax level determinant theory may not offer a thorough comprehension of the impact of sectoral employment on tax revenue as a result of structural transformation. The theory of structural transformation offers an explanation for the phenomenon of structural change in the main sectors of the economy, which subsequently influences economic growth and the accumulation of tax revenue, as demonstrated by the discoveries of Kuznets in 1966. Prior academics, like Epaphra and Kaaya (2020), Masiye (2019) and Rahim and Asma (2019), have previously employed this theory to analyse the sectoral composition and tax revenue. However, they failed to demonstrate the correlation between this theory and sectoral employment composition in explaining the impact on tax revenue. Therefore, this study combined the two theories to ensure that structural transformation develops tax bases for different economic sectors (agricultural, industrial, and services), thereby impacting tax revenue. This work provides the theoretical background and contribution.

2.3. Sectoral employment and Tax revenue

The existing body of research has analysed the relationship between employment and tax revenue. However, studies by Andrejovská and Puliková (2018), Caro and Sacchi (2020), Hamdan and Rana (2021), Khujamkulov (2016), Mazhar and Méon (2017), Siami-namini et al. (2018), and Vlachaki (2015) indicate little focus on the relationship between employment in different sectors of the economy and tax revenue. Kuznets (1966) and Lewis (1954) argue that to stimulate economic growth and increase tax revenue, it is necessary to bring about structural changes in the key sectors of the economy. One of the components of structural transformation is a shift in employment levels within the key sectors of the economy. Several studies have examined the relationship between overall employment and tax revenue, excluding employment in each main sector of the economy.

Khujamkulov (2016) used panel data analysis to analyse a sample of 33 transitional nations from 1991 to 2014. The outcomes of this study suggest a positive relationship

between the employment rate and tax revenue, indicating that as the employment rate increases, so does the tax revenue. Siami-namini et al. (2018) did a study in Washington, DC, from 1984 to 2015. The study employed the Johansen co-integration techniques in addition to the bivariate and multivariate vector error correction model (VECM). The study identified a correlation between tax revenue and employment among residents. Resident employment has both short- and long-term impacts on actual individual taxes. Furthermore, Andrejovská and Puliková (2018) conducted a regression study utilising three models: the pooling model, the fixed effects model, and the random effects model. They found a substantial correlation between tax revenue and employment rates among the 28 member states of the European Union. Cevik et al. (2019) did a study using panel regression analysis to examine data from 134 countries between 1970 and 2014. The study's findings indicate that the efficacy of value-added tax (VAT) decreases as the service sector's employment level increases. The authors additionally suggested that self-employment is a contributing factor to the decrease in the effectiveness of value-added tax (VAT) in the service sector.

Hamdan and Rana (2021) utilised the ordinary least squares (OLS) method to determine the correlation between employment growth and tax revenue in emerging nations. Their findings revealed that employment growth negatively affects tax revenue in China and Malaysia, but positively affects tax revenue in Pakistan, India, Brazil, and Mexico. In general, most previous research concentrated on overall employment by employing panel data analysis for estimating purposes. (Mwakalobo, 2009) argued that the absence of country-specific variables in cross-country studies can result in distorted findings. Unlike other studies, this research specifically examined how employment composition in different sectors of the economy affects tax revenue. The study utilised time series data and the ECM within the Autoregressive Distributed Lag (ARDL) approach for estimation. Therefore, an interesting question in this study was how employment composition in each main sector of the economy affects tax revenue in Tanzania. Consequently, this study proposed the following hypotheses:

H1: Employment in the agriculture sector has little contribution to tax revenue in Tanzania

H2: Employment in the service sector has a large contribution to tax revenue in Tanzania

H3: Employment in the industry sector has a large contribution to tax revenue in Tanzania

3.0 Methodology

3.1 Sample of Data

Data collection and analysis followed a time series design spanning from 1970 to 2018. Ary et al. (2010) found that the design can alter the temporal behaviour of series data. The data were obtained during this specific time because, after 1970, most developing nations, including Tanzania, underwent a process of sectoral structural transformation

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(McMillan et al., 2014). Furthermore, the choice of the time was determined by the availability of data related to the variables of interest.

3.2 Variable Measurements and Sources of Data

The variables under consideration in this study are tax revenue and the share of employment in the agriculture, industry, and service sectors. However, additional control variables such as GDP per capita and trade openness were included in the model to enhance the reliability of the results. Tax revenue was a dependent variable. We acquired the tax revenue data from the Bank of Tanzania. The explanatory variables considered in this study encompassed employment in the agriculture, industry, and service sectors. The explanatory variables were quantified by measuring the share of employment in the agricultural, service, and industry sectors relative to total employment. The explanatory variables were sourced from the Groningen Growth and Development Centre (GGDC) database. The measurement of sectoral employment composition was derived from the works of Herrendorf and Rogerson (2013) and Sen (2019). In addition, statistics for control variables, which are GDP per capita and trade openness, were acquired from the Bank of Tanzania. The variable measurements are displayed in Table 1.

Table 1: Variable measurements

Variable	Measurement	Sources of Measurements of variables
Dependent variable		
Tax revenue	Tax to GDP	World Bank Indicators (2020)
Independent variables: Sectoral employment		
Employment in agriculture sector	The number of human resources employed in the agriculture sector to total employment	(Herrendorf, 2013; Sen, 2019)
Employment in service sector	The number of human resources employed in the service sector to total employment	(Herrendorf, 2013; Sen, 2019)
Employment in industry sector	Number of human resources employed in industry sector to total employment	(Herrendorf, 2013; Sen, 2019)
Control variables:		
GDP per capita	Real GDP per population	(Mwamkonko, 2019)
Trade openness	Trade volume (import plus export) to GDP	(Mwamkonko, 2019)

3.3 Estimation strategy

Before commencing the estimation procedure, it is critical to conduct significance tests, which encompass descriptive and statistical analysis, as well as examine the presence of unit roots and co-integration. These tests serve the purpose of confirming that the variables are devoid of outliers, do not exhibit unit roots, and possess long-term associations, respectively. Descriptive statistical analysis was used to determine if the variables used in regression analysis are devoid of any data outliers. Correlation analysis examines the connection between variables, which should be valued lower than 0.9 (Wooldridge, 2015). A unit root test was conducted to determine whether the time series exhibits constant mean, variance, and covariance across time. This is important because non-stationary data can lead to inaccurate outcomes. In order to achieve stationary variables in this study, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (P-P) tests were employed, based on the following hypotheses: The null hypothesis (H0) states that this variable has a unit root, indicating that it is not stationary. Alternative hypothesis (H1): The variable does not exhibit a unit root and is therefore considered to be stationary. A cointegration test was conducted to demonstrate the existence of a long-run link between two or more variables. Furthermore, it verifies that the regression is not spurious (Sibindi, 2014). The present study utilised the bound test approach developed by Pesaran and Shin (1999), Pesaran et al.(2001). The null hypothesis states that there is no cointegration, while the alternative hypothesis suggests that cointegration does exist.

In addition, the estimation of variables was conducted using the ECM as described by Wooldridge (2015). The ECM is a component of the ARDL strategy. It addresses the issue of disequilibrium that arises from the loss of information during the differencing of time series data (Gujarati, 2004). Employing ECM helps achieve both short-run and long-term effects as predicted by the regression equation (Gebremariam & Ying, 2022). The model frequently demonstrates the impact by assigning a negative value to the adjustment coefficient of the Error-correction term (ECT). The ARDL technique has the advantage of mitigating endogeneity to a smaller extent. This is achieved by treating each constituent variable in the model as an independent equation (Wegari et al., 2023). Furthermore, the ARDL model is commonly utilised since it has the inherent ability to handle different levels of integration and is considered to be better than traditional or frequently used cointegration models (Abdulai, 2023). In this paper, we employ the ARDL to study how sectoral employment composition affects tax revenue.

TR=f (SEA, SEI, SES, X)…… (1)

TR_t = Tax revenue
SEA_t = Share of employment in Agriculture sector
SEI_t = Share of employment in industry sector
SES_t = Share of employment in Service sector

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X= Control variables

μ_t = Error term

Econometrically, Model 1 is presented in the following estimation regression equation:

$$TR_t = \beta_0 + \beta_1 SEA_t + \beta_2 SEI_t + \beta_3 SES_t + \beta_4 GPC_t + \beta_5 TO_t + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where;

TR_t = Tax revenue

SEA_t = Share of employment in Agriculture sector

SEI_t = Share of employment in industry sector

SES_t = Share of employment in Service sector

GPC_t = GDP per capita

TO_t = Trade openness

μ_t = Error term

Therefore, the econometric model in the ARDL form can be represented as:

$$\Delta TR_t = \sum_{i=1}^{n} \partial_i \, \Delta TR_{t-1} + \sum_{i=0}^{n} \gamma_i \, \Delta SEA_{t-1} + \sum_{i=0}^{n} \delta_i \, \Delta SEI_{t-1} + \sum_{i=0}^{n} \omega_i \, \Delta SES_{t-1} + \sum_{i=0}^{n} \epsilon_i \, \Delta GPC_{t-1} + \sum_{i=0}^{n} \epsilon_i \, \Delta TO_{t-1} + \beta_1 \, SEA_{t-1} + \beta_2 \, SEI_{t-1} + \beta_3 \, SES_{t-1} + \beta_4 \, GPC_{t-1} + \beta_4 \, TO_{t-1} \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Δ means first difference, n is the lag order length, and μ_t is the error term

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

Where;

H_0 is null hypothesis (no long run relationships)

H_1 is alternative hypothesis (a long-run relationship exists)

$\partial, \gamma, \sigma, \omega, \alpha, \epsilon$ are the short-run coefficients in the ARDL model.

4.0 Results and Discussion

4.1 Descriptive statistics and pairwise correlation results

Table 2 revealed that tax revenue had the maximum mean value of 12.49, whereas employment in the industry sector variable had the lowest mean value of 0.037. In addition, the tax revenue exhibits a significant standard deviation of 3.288, indicating a high level of volatility in the collection of income. Conversely, employment in the industrial sector has the lowest standard deviation of 0.022. The findings from Table 2 demonstrate that there are no outliers, indicating that none of the data points significantly deviate from the others. Furthermore, to examine the relationships between the variables, a correlation analysis was conducted. The results from Table 3 indicate that all variables have correlation values below 0.90. When the correlation value

is larger than 0.90, it indicates a strong degree of collinearity among the variables, which might lead to subjective outcomes (Wooldridge, 2015). The results presented in Tables 2 and 3 confirm that all variables included in this study are suitable for further analysis.

Table 2: Descriptive statistics

Variables	Observations	Mean	Std. Dev.	Min	Max
Tax revenue	49	12.490	3.288	8.118	20.032
Employment in Agriculture sector	49	0.824	0.073	0.690	0.914
Employment in industry sector	49	0.037	0.014	0.022	0.066
Employment in service sector	49	0.140	0.06	0.360	0.251
GDP per capita	49	2.86	0.662	2.397	4.599
Trade openness	49	1.75	0.090	1.600	3.380

Source: Authors' computations *using STATA*

Table 3: Pairwise correlations Matrix analysis

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Dependent variable						
(1) Tax revenue	1.000					
Independent variables						
(2) Share of employment in Agriculture Sector	0.421	1.000				
(3) Share of employment in Industry Sector	-0.277	-0.967	1.000			
(4) Share of employment in Service Sector	-0.454	-0.998	0.753	1.000		
(5) GDP per capita	-0.242	-0.601	0.68	1.12	1.000	
(6) Trade openness	0.313	-0.174	0.42	2.24	0.097	1.000

Source: Authors' computations *using STATA*

4.2 Tests for Stationarity

The unit root test was conducted to ensure the stationarity of the data. The outcome from Table 4 demonstrates that all variables exhibit stationarity when differenced once (order one (I (1))). The data's stationarity was confirmed by test statistic values that exceed the upper critical values in absolute terms in both the ADF and P-P tests at the 1% level of significance. Therefore, the null hypothesis was rejected, leading to the conclusion that all variables are stationary.

 https://doi.org/10.58548/2025jaep31.0122

Table 4: Results of Augmented Dickey–Fuller Unit Root Test.

	Augmented Dickey–Fuller (ADF) test		Phillips–Perron test		
Variables	**Level constant and trend**	**First difference Constant trend**	**Level constant and trend**	**First difference Constant trend**	**Order of integration**
Tax revenue	-1.764 (0.398)	-8.125 (0.000)	-1.625(0.470)	-8.343(0.0000)	I (1)
Employment in Agriculture sector	1.379(0.997)	-3.573(0.0063)	0.721(0.990)	-3.613(0.0055)	I (1)
Employment in industry sector	0.685(0.989)	-4.581(0.0001)	0.195(0.972)	-4.702(0.0001)	I (1)
Employment in Service sector	1.133(0.995)	-3.185(0.00208)	0.557(0.986)	-3.170(0.0218)	I (1)
GDP per capita	1.434(0.997)	-6.375 (0.000)	2.261(0.998)	-6.395(0.000)	I (1)
Trade openness	-2.088 (0.249)	-5.750 (0.000)	-2.297(0.172)	-5.727(0.000)	I (1)

Source: Authors' computations *using STATA*

4.3 Cointegration Test

The results of the bounds cointegration test are displayed in Table 5. The variables examined in this study are co-integrated, as demonstrated by the F statistic. Moreover, Table 5 shows that, F-statistic is 7.176, surpassing the upper critical threshold of 6.097. According to Table 5, the results are statistically significant at the 1% level. Therefore, we may reject the null hypothesis and conclude that there is co-integration among the variables.

Table 5: Bounds Test for Cointegration Analysis

Critical Value	Lower Bound	Upper Bound
1%	4.888	6.097
5%	3.459	4.810
10%	2.849	3.040
P-Value	0.013	0.004
F-Statistics		7.176

Source: Authors' computations *using STATA*

4.4 Short-run and long-run Results of the Tax Revenue Equation

Following the completion of crucial examinations, Equation 3 was estimated using the ECM.

Table 6: Short-run and Long-run Results of Tax Revenue Equation

Long Run: Tax revenue	Coef.	Std. Err.	T	P>t
Employment in Agriculture sector				
L1.	1.755	0.301	0.92	0.362
Employment in industry sector				
L1.	3.444	0.298	6.82	0.001***
Employment in Service sector				
L1.	-7.140	0.335	-0.970	0.337
GDP per capita				
L1	-5.568	0.499	-0.480	0.631
Trade openness				
L1	0.874	0.157	0.760	0.455
Short Run: Tax Revenue				
Ln Tax revenue				
LD.	0.253	0.128	1.97	0.057*
Employment in Agriculture sector				
D1.	5.005	0.250	0.95	0.347
Employment in industry sector				
D1.	-58.455	0.727	-5.89	0.000***
LD.	-21.142	1.199	-1.73	0.092*
L2D.	-33.104	0.393	-2.91	0.006**
Employment in Service sector				
D1.	3.300	0.360	1.92	0.023**
GDP per capita				
D1.	-0.339	0.373	-0.91	0.370
Trade openness				
D1.	0.053	0.024	2.17	0.036**
_cons	-3.202	5.281	-0.61	0.548
ECT(-1)	-0.740	0.129	-5.73	0.000***
R-squared	0.793			
F-statistics	43.12			0.000***
Adj R-squared	0.529			

*Statistically significant at the 10% level
**Statistically significant at 5% level
***Statistically significant at 1% level

Source*: Authors' computation using STATA*

 https://doi.org/10.58548/2025jaep31.0122

The variable Tax revenue (TR) was subjected to a regression analysis, with its covariates (employment in the agriculture sector, employment in the industry sector, employment in the service sector, GDP per capita, and trade openness) all in differenced form. We used the ARDL (2, 1, 0, 1, 1, and 0) regression model, determining an appropriate lag-length of 4 based on AIC. The ARDL (2, 1, 0, 1, 1, and 0) represents the lag structure in the regression equation 3. Table 6 displays the outcomes of the short-term and long-term estimations of the variables.

Table 6 displays a value of 0.740 with a p-value of 0.000. At the 1% significance level, the ECT coefficient has a statistically significant negative value. This finding demonstrates the existence of a rapid adaptation mechanism. The rate at which a system returns to equilibrium after a shock is directly proportional to the amount of the error correction coefficient. Furthermore, the results indicate that the R^2 value is 0.793, and the adjusted R^2 value is 0.529. The coefficient of determination (R^2) measures the extent to which changes in the independent variables—specifically, the share of employment in the agriculture sector, the share in the industry sector, the share in the service sectors, GDP per capita, and trade openness in Tanzania—can explain variations in the dependent variable, tax revenue. The model also demonstrates an F-statistic of 43.12, which indicates statistical significance at the 1% level ($p = 0.000$). Below, we provide detailed explanations for each variable's results.

In the long run, there is a positive relationship between the share of employment in industry and tax revenue. This finding suggests a direct relationship between a slight increase in the employment share within the industry sector and a corresponding rise in Tanzania's tax revenue. The concentration of numerous industries in specific cities allows the government to accurately assess the workforce size for taxation purposes. Furthermore, the industry sector's formalisation process and increased responsiveness to taxation may explain the correlation between the variables, potentially leading to an increase in tax revenue. The study's findings align with the structural transformation theory, which posits that there is a direct correlation between structural transformation and the presence of job opportunities in the industrial sector.

In the short run, the proportion of employment in the industry sector has a statistically significant negative impact on tax revenue. Therefore, during a certain timeframe, a small rise in the proportion of employment in the industry sector results in a corresponding decrease in tax revenue in Tanzania. The outcome could be due to a lack of formalisation in numerous industries, which presents challenges in the implementation of tax laws. The findings of this study are in direct opposition to the fundamental theoretical framework upon which it is based.

Furthermore, in the short term, the service sector employment has a statistically significant positive impact on Tanzania's tax collection. We can attribute the observed outcome to the temporal aspect, where employment in the service sector initially adheres to established frameworks before transitioning into self-employment, thereby raising taxation concerns. The findings align with the structural transformation theory that forms the basis of this study. Furthermore, this study's findings contradict those of Cevik et al. (2019), who discovered a negative correlation between the share of employment in the service sector and the efficacy of value-added tax (VAT).

The employment composition in the agriculture sector has an insignificant long-term and short-term effect. This effect may arise from the prevalent informality in the sector, as numerous agricultural employees work in unregulated environments where transactions remain unrecorded and tax compliance is negligible. Moreover, in the agricultural sector, employment typically offers lower wages relative to formal employment in the industrial and service sectors, leading to diminished income tax revenue. Furthermore, smallholder farmers and informal agribusinesses may lack legal registration, resulting in minimal contributions to corporate tax revenue. A further explanation for the insignificant effect may stem from tax exemptions and subsidies granted by the government to promote agricultural development, hence diminishing the sector's direct revenue contribution. This effect aligns with the conclusions of a research by Williams (2013), which found that a change in employment in agriculture sector has little effect on tax revenue. Moreover, this result aligns with the theories underpinning this study.

Trade openness has a beneficial impact on tax revenue in the short run. This occurrence might be attributed to the simplicity of taxation in the realm of international trade, which includes both imports and exports. Thus, the results indicate that improving Tanzania's import and export strategy will result in an increase in tax revenue. This finding aligns with the research undertaken by Jaffri et al. (2015), Mwakalobo (2009), and Terefe and Teera (2018). Furthermore, the findings align with the Tax Level Determinants Theory, which serves as the theoretical foundation for this research.

The GDP per capita yielded an interesting result, suggesting inconclusive findings within a restricted time. The insignificant finding may be attributed to the presence of a shadow economy in Tanzania, represented by a major informal sector where a considerable share of economic activities may go unreported. Langford and Ohlenburg (2015), who also concluded that there is no statistically significant correlation between GDP per capita and tax revenue, concur with the findings. Furthermore, the actual result deviates from the theoretical viewpoint, which states that an increase in GDP per capita results in a proportional increase in tax income. Therefore, it can be inferred from the

 https://doi.org/10.58548/2025jaep31.0122

aforementioned findings that the impact of sectoral employment composition resulting from structural transformation on tax revenue in Tanzania is significant.

4.5 Diagnostic and Stability Tests

This study utilised diagnostic tests such as serial correlation, heteroscedasticity, and normality to assess the data. The study employed the Breusch-Godfrey test to analyse the existence of serial correlation, the Breusch-Pagan test to evaluate heteroscedasticity, and the Jarque-Bera test to assess normalcy. The diagnostic test result is displayed in Table 7. Based on the results of the diagnostic tests, it may be inferred that the assumptions of the ARDL regression model have been met, therefore creating confidence in the model's validity. Furthermore, this study evaluated the stability of the ARDL model by employing the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests. The purpose was to determine whether the variables that forecast tax revenue exhibit structural stability or instability. The findings depicted in Figures 1 and 2 demonstrate that there is no movement beyond the critical lines, thereby indicating the stability of the regression parameters. Hence, it can be inferred that the estimates for both the long-term and short-term are stable in structure throughout the sample period in Tanzania.

Table 7: Diagnostic Tests

	Null Hypothesis	Test Statistics	Decision
Breusch-Pagan	Homoskedasticity	0.010 (0.903)	Do not reject H0
The Breusch-Godfrey Serial Correlation LM Test	No autocorrelation	0.326 (0.568)	Do not reject H0
Jarque-Bera (JB) Test	Normality of error term	5.337 (0.069)	Do not reject H0

Source*: Authors' computation using STATA*

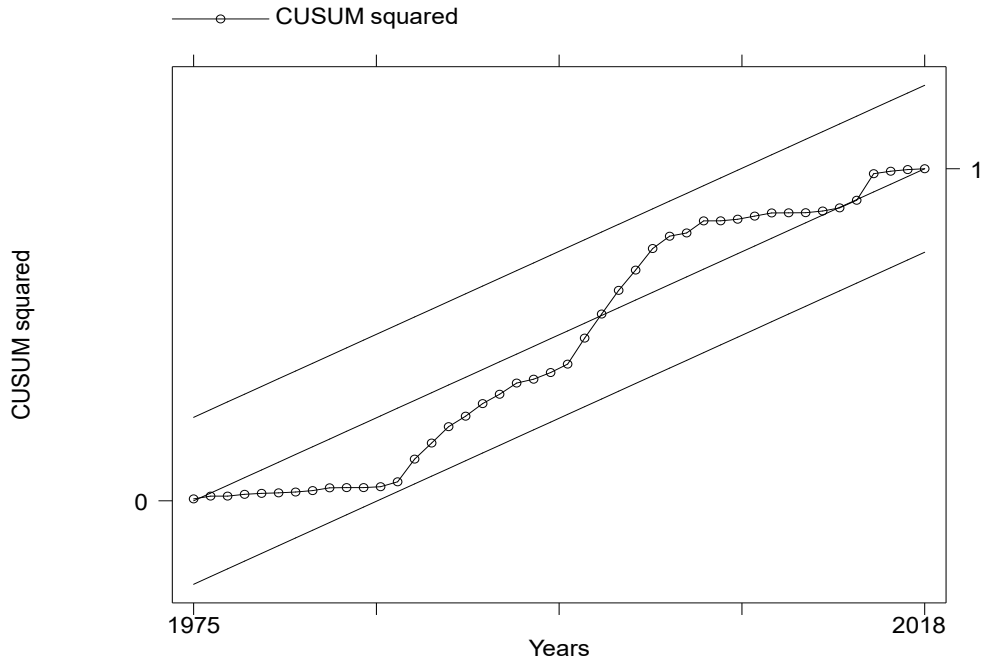

Figure 1: Cusum squared stability test

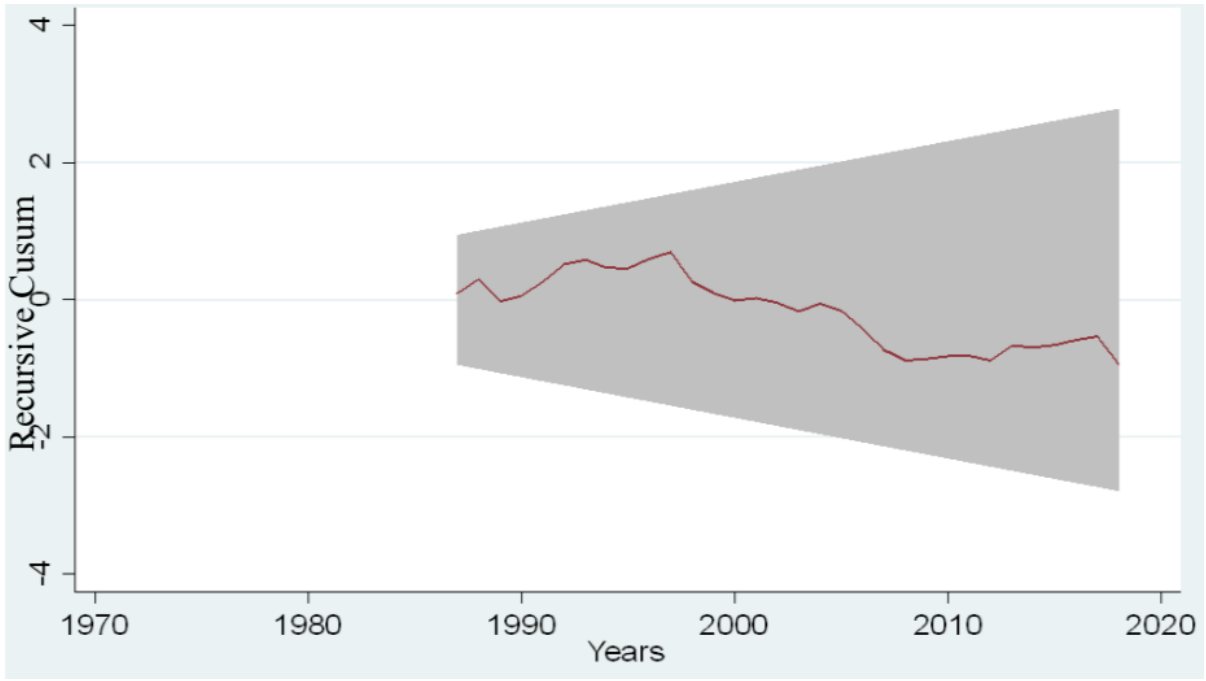

Figure 2: Recursive Cusum stability test result

5.0 Conclusions

The study analysed the effect of sectoral employment composition on Tanzania's tax revenue. The time series data was used from 1970 to 2018 and utilised the ECM within the ARDL model for estimation. We employed the tax revenue as the dependent variable

and regressed it with the independent variable, sectoral employment composition, and additional control variables. The control variables encompassed GDP per capita and trade openness. The current study's analysis has demonstrated that sectoral employment composition has a statistically significant impact on Tanzania's tax revenue generation, both in the short and long run. The practical contribution of this study is that the government and policymakers will be able to improve tax revenue by focusing on the specific sector which significantly affects it. This is because the study provides the effect of employment composition in each specific sector on tax revenue. Therefore, the government and policymakers need to work with the composition of employment in the service and industry sectors to address the challenge of low tax revenue. The government should also consider the sectoral employment transformation policy to enhance tax revenue collection in Tanzania. Furthermore, the authorities recommended focusing on trade openness as a means to enhance tax revenue. Theoretically, this study addresses the gap by offering empirical evidence regarding the impact of the sectoral employment composition for specific sectors on tax revenue. This current study provides empirical evidence to expand the understanding of the mechanisms by which sectoral employment composition affects tax revenue. This contributes to prior studies that examined the impact of aggregate employment on tax revenue across various contexts.

While the current research significantly enhances the understanding of the impact of sectoral employment composition on tax revenue, various limitations and considerations and suggested for further research. First, the study concentrated on total tax revenue. Future research could focus on disaggregate tax revenue to evaluate different tax categories as dependent variables. Secondly, due to the restricted focus of this study, it is advisable for future research efforts to include multiple countries in order to conduct a more thorough analysis. Lastly, this study exclusively relies on quantitative data. Future research should consider incorporating mixed methods to improve the understanding of the factors under study, as this strategy has the potential to yield different results.

References

Abdulai, A. M. (2023). The impact of remittances on economic growth in Ghana: An ARDL bound test approach. *Cogent Economics and Finance*, *11*(2), 1–14. https://doi.org/10.1080/23322039.2023.2243189

African Development. (2016). *Structural transformation, agriculture and Africa's development Key messages*. retrieved from https://www.afdb.org/sites/default/files/documents/publications/adr15_chapter_6.pdf

Agbenyo, J. S. (2020). The Structural Change Theory – An Analysis of Success and Failures of Technology. *International Journal of Research and Innovation in Social Science*, *IV*(I), 1–5. www.rsisinternational.org

Alabede, J. O. (2018). Economic freedom and tax revenue performance in sub-Saharan Africa. *Journal of Financial Reporting and Accounting*, *16*(4), 610–638. https://doi.org/10.1108/JFRA-04-2017-0024

Amadou, A., & Aronda, T. (2020). Structural transformation in sub-Saharan Africa: A comparative analysis of sub-regions' performances. *African Journal of Economic and Management Studies*, *11*(2), 233–252. https://doi.org/10.1108/AJEMS-06-2019-0236

Andrejovská, A., & Puliková, V. (2018). Tax revenues in the context of economic determinants. *Montenegrin Journal of Economics*, *14*(1), 133–141. https://doi.org/10.14254/1800-5845/2018.14-1.10

Arodoye, N. L., & Izevbigie, J. N. (2019). Sectoral Composition and Tax Revenue Performance in ECOWAS Countries. *Oradea Journal of Business and Economics*, *Vol. 4*(No. 2), 45–55. https://doi.org/10.47535/1991ojbe077

Ary, D., Jacobs, C. L., & Sorensen, C. (2010). *Introduction to Research in Education* (D. Hays, Ed.; 8th ed.). Nelson Education, Ltd.

Bank of Tanzania. (2019). Tax Statistics Report Tanzania Mainland. In *Development*. retrieved from https://www.bot.go.tz/Publications/Filter/16

Bolívar, M. P. R., Galera, A. N., Muñoz, L. A., & Subires, M. D. L. (2016). Analysing forces on the financial contribution of local governments to sustainable development. *Sustainability (Switzerland)*, *8*(9), 1–18. https://doi.org/10.3390/su8090925

Caro, P. Di, & Sacchi, A. (2020). The heterogeneous effects of labour informality on VAT revenues: Evidence on a developed country. *Journal of Macroeconomics*, *63*(April 2019), 1–14. https://doi.org/10.1016/j.jmacro.2020.103190

Cevik, S., Gottschalk, J., Hutton, E., Jaramillo, L., Karnane, P., & Sow, M. (2019). Structural transformation and tax efficiency. *International Finance*, *Vol. 22*(No.3), 341–379. https://doi.org/10.1111/infi.12346

Epaphra, M., & Kaaya, L. (2020). Tax Revenue Effect of Sectoral Growth and Public Expenditure in Tanzania: An application of the Autoregressive Distributed Lag Model. *Journal of Quantitative Finance and …*, *2*(2), 1–48. http://arfjournals.com/abstract/92179_7_manamba_epaphra_jqfe-new.pdf

Fisher, A. G. B. (1939). Production, Primary, Secondary and Tertiary. *The Economic Record*, *15*(1), 24–38. https://doi.org/https://doi.org/10.1111/j.1475-4932.1939.tb01015.x

Gebremariam, T. K., & Ying, S. (2022). The foreign direct investment-export performance nexus: An ARDL-based empirical evidence from Ethiopia. *Cogent Economics and Finance*, *10*(1), 1–15. https://doi.org/10.1080/23322039.2021.2009089

Gujarati, D. N. (2004). *Basic Econometrics* (4th ed.). The McGraw—Hill Companies.

Hamdan, S., & Rana, F. (2021). Determinants of Tax Revenue in Emerging Countries. *PalArch's Journal of Archaeology of Egypt …*, *11*(2), 148–160. https://www.archives.palarch.nl/index.php/jae/article/view/8073

Hammond, P., Kwakwa, P. A., Berko, D., & Amissah, E. (2023). Taxing the informal sector through modified taxation: Implementation challenges and overcoming strategies. *Cogent Business and Management*, *10*(3), 1–26. https://doi.org/10.1080/23311975.2023.2274172

Herrendorf, B., & Rogerson, R. (2013). Growth and Structural Transformation * Prepared for the Handbook of Economic Growth. In *Handbook of Economic Growth* (pp. 1–22). https://www.imf.org/external/np/seminars/eng/2013/SPR/pdf/rrog2.pdf

Hungu, O. A. (2024). Impact of Financial Liberalisation on Economic Growth: An Empirical Evidence from Tanzania. *Journal of African Economic Perspectives*, *2*(1), 76–96. https://doi.org/10.58548/2024jaep21.7696

Jaffri, Tabassum, & Asjed. (2015). An Empirical Investigation of the Relationship Between Trade Liberalisation and Tax Revenue in Pakistan. *Pakistan Economic and Social Review*, *53*(2), 317–330.

Jemiluyi, O. O., & Jeke, L. (2023). Tax revenue mobilisation effort in the Southern African Development Community (SADC) bloc: Does ICT matter? *Cogent Economics and Finance*, *11*(1). https://doi.org/10.1080/23322039.2023.2172810

Karagöz, K. (2013). Determinants of tax revenue: Does sectoral composition matter? *Journal of Finance, Accounting, and Management*, *4*(3), 50–63.

Khujamkulov, I. (2016). *Tax revenues in transition countries: Structural changes and their policy implications* (Issue December). retrieved from https://doi.org/10.35188/UNU-WIDER/2016/224-3

Kibret, H., & Mamuye, R. (2016). Performance and prospects of tax collection in Ethiopia. In the *United Nations Development Programme*. retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/et/Performance-and-prospects-of-tax-colllection-in-ET.pdf

Kuznets, S. (1973). Modern Economic Growth : Findings and Reflections. *The American Economic Review*, *63*(3), 165–184.

Langford, B., & Ohlenburg, T. (2015). Tax revenue potential and effort - an empirical investigation. In the *International Growth Centre*.

Lewis, W. (1954). Economic Development with Unlimited Supplies of Labour. *The Manchester School*, *XXL*(2), 136–191.

Lotz, J., & Morrs, E. (1967). Measuring Tax Effort in Developing Countries. *The Journal of Development Studies*, *21*(3), 390–405. https://doi.org/10.1080/00220388508421950

Masiye, M. (2019). *Fiscal policy in African development: "qual-quant" analysis with special reference to Zambia Mike Masiye A thesis submitted for the degree of Doctor of Philosophy Department of Economics - The University of Sheffield* (Issue September).

Mawejje, J., & Munyambonera, E. F. (2016). Effects of Sectoral Growth and Public Expenditure in Uganda. *Journal of Economics and Business*, *12*(5), 1456–1489.

Mazhar, U., & Méon, P. G. (2017). Taxing the unobservable: The impact of the shadow economy on inflation and taxation. *World Development*, *90*, 89–103. https://doi.org/10.1016/j.worlddev.2016.08.019

McMillan, M., Rodrik, D., & Verduzco-Gallo, Í. (2014). Globalisation, Structural Change, and Productivity Growth, with an Update on Africa. *World Development*, *63*, 11–32. https://doi.org/10.1016/j.worlddev.2013.10.012

McNabb, K. (2018). Tax Structures and Economic Growth: New Evidence from the Government Revenue Dataset. *Journal of International Development*, *30*(2), 173–205. https://doi.org/10.1002/jid.3345

Moore, M., & Prichard, W. (2020). How Can Governments of Low-Income Countries Collect More Tax Revenue? *The Politics of Domestic Resource Mobilisation for Social Development*. https://doi.org/https://doi.org/10.1007/978-3-030-37595-9_4

Mwakalobo, A. (2009). Economic Reforms in East African Countries : The Impact on Government Revenue and Public Investment. *Open Access Dissertations*, 1–194.

Mwamkonko, A. M. (2019). *The Impact of fiscal and monetary policies on economic growth and stability in Tanzania* [University of Dodoma]. http://repository.udom.ac.tz

Ndoye, M. L. (2014). *Trade Liberalisation and Tax Revenue Mobilisation in ECOWAS countries* (Issue August). retrieved from https://publication.aercafricalibrary.org/server/api/core/bitstreams/bb814868-425c-47a1-9772-c73b62536703/content

Neog, Y., & Gaur, A. K. (2020). Macro-economic determinants of tax revenue in India: An application of the dynamic simultaneous equation model. *International Journal of Economic Policy in Emerging Economies*, *13*(1), 13–35. https://doi.org/10.1504/IJEPEE.2020.106682

Nguyen, M., Pham, T., & Quan, B. (2022). The determinants of tax revenue : A study of Southeast Asia The determinants of tax revenue : A study of Southeast Asia. *Cogent Economics & Finance*, *10*(1). https://doi.org/10.1080/23322039.2022.2026660

Pesaran, M., & Shin, Y. (1999). *An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis: Econometrics and Economic Theory in the 20th Century* (pp. 371–413).

Pesaran, M., Smith, R. ., & Shin, Y. (2001). Bound Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://doi.org/http://doi.org/10.1002/jae.616

Rahim, F. U. R., & Asma, M. (2019). Heterogeneous Effects of Sectoral Growth on Tax Yields in Developing Economies. *Pakistan Economic and Social Review*, *57*(2), 199–219. https://search.proquest.com/scholarly-journals/heterogeneous-effects-sectoral-growth-on-tax/docview/2358375003/se-2?accountid=25704

 https://doi.org/10.58548/2025jaep31.0122

Regassa, D. (2017). *Factors Influencing Tax Revenue in Ethiopia(Co-integration approach). A Thesis Submitted to the Department of Accounting and Finance of Addis Ababa University*.

Sen, K. (2019). Structural transformation around the world: Patterns and drivers. *Asian Development Review*, *36*(2), 1–31. https://doi.org/10.1162/adev_a_00130

Sewell, W. H. (1992). A Theory of Structure : Duality, Agency, and Transformation. *American Journal of Sociology*, *98*(1), 1–29. https://www.jstor.org/stable/2781191

Shawn, R., Rosenthal, S., & Ross, A. (2012). Tax Avoidance and Business Location in a State Border Model. *Journal of Urban Economics*, 5–24.

Siami-namini, S., Muhammad, D., & Fahimullah, F. (2018). *The Short and Long Run Effects of Selected Variables on Tax Revenue - A Case Study*. *5*(5), 23–32. https://doi.org/10.11114/aef.v5i5.3507

Sibindi, A. B. (2014). Life insurance, financial development and economic growth in South Africa. *Risk Governance and Control: Financial Markets and Institutions*, *4*(3), 7–15. https://doi.org/10.22495/rgcv4i3art1

Skott, P. (2021). Fiscal policy and structural transformation in developing economies. *Structural Change and Economic Dynamics*, *56*, 129–140. https://doi.org/10.1016/j.strueco.2020.10.006

Terefe, K., & Teera, J. (2018). Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. *Journal of Economics and International Finance*, *10*(11), 134–155. https://doi.org/10.5897/jeif2018.0924

Un-Habitat. (2016). *Structural Transformation in Developing Countries: Cross-Regional Analysis*. retrieved from http://unhabitat.org/books/structural-transformation-in-developing-countries-cross-regional-analysis/

Vlachaki, M. (2015). The Impact of the Shadow Economy on Indirect Tax Revenues. *Economics and Politics*, *27*(2), 234–265. https://doi.org/10.1111/ecpo.12054

Wandaogo, A.-A., Sawadogo, F., & Lastunen, J. (2022). *Does the adoption of peer-to-government mobile payments improve tax revenue mobilisation in developing countries?* (Issue February). retrieved from https://doi.org/10.35188/UNU-WIDER/2022/149-5

Wegari, H. L., Whakeshum, S. T., & Mulatu, N. T. (2023). Human capital and its impact on Ethiopian economic growth: ARDL approach to co-integration. *Cogent Economics and Finance*, *11*(1), 1–19. https://doi.org/10.1080/23322039.2023.2186046

Wooldridge, J. M. (2015). Introductory Econometrics 6th Edition. In *Economica* (Vol. 42, Issue 165). www.cengage.com/highered

World Bank. (2020). Achieving Sustainable Development Goal 17? An Empirical Investigation of the Effectiveness of Aid Given to Boost Developing Countries' Tax Revenue and Capacity. *International Studies Quarterly*, *64*(4), 991–1004. https://doi.org/10.1093/isq/sqaa069

World Bank. (2021). *World development indicators*. retrieved from https://databank.worldbank.org/source/world-development-indicators

World Bank. (2024). *Taxes and Government revenue*. Retrieved from https://www.worldbank.org/en/topic/taxes-and-government-revenue.